A STUDY OF ESTIMATION OF BLOOD LOSS AND FACTORS INFLUENCING BLOOD LOSS IN TRANSURETHRAL RESECTION OF PROSTATE

Dissertation submitted in partial fulfilment of the requirements of

M.Ch DEGREE EXAMINATION

BRANCH 1V – UROLOGY

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&
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AUGUST-2013

CERTIFICATE

This is to certify that this dissertation entitled **"A STUDY OF ESTIMATION OF BLOOD LOSS AND FACTORS INFLUENCING BLOOD LOSS IN TRANSURETHRAL RESECTION OF PROSTATE"** submitted by **Dr.VETRICHANDAR.S** appearing for **M.Ch UROLOGY** degree examination in August 2013 is a original bonafide record of work done from August 2010 to February 2013 by him under my guidance and supervision in partial fulfillment of requirement of the Tamil Nadu Dr. M.G.R. Medical University, Chennai. I forward this to the Tamil Nadu Dr. M.G.R. Medical University, Chennai, Tamil Nadu, India.

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DECLARATION

I, Dr. VETRICHANDAR.S solemnly declare that this dissertation **"A STUDY OF ESTIMATION OF BLOOD LOSS AND FACTORS INFLUENCING BLOOD LOSS IN TRANSURETHRAL RESECTION OF PROSTATE"** was done by me at the Department of Urology, Kilpauk Medical College, Chennai 10, under the guidance and supervision of the Professor of urology, Kilpauk Medical College, Chennai-10, between 2010 and 2013.

This dissertation is submitted to the Tamil Nadu Dr. M.G.R. Medical University, Chennai-600032 in partial fulfillment of the University requirements for the award of the degree of M.Ch., Urology.

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TABLE OF CONTENTS

SL.NO	TITLE	PAGE NO.
1.	INTRODUCTION	01
2.	AIM OF THE STUDY	03
3.	REVIEW OF LITERATURE	04
4.	MATERIALS AND METHODS	23
5.	OBSERVATIONS AND RESULTS	28
6.	ANALYSIS	44
7.	DISCUSSION	47
8.	CONCLUSION	56
9.	BIBILIOGRAPHY	
10.	APPENDIX I	
11.	APPENDIX II	
12.	APPENDIX III	
13.	APPENDIX IV	
14.	APPENDIX V	

LIST OF ABBREVATIONS

BPH	-	Benign prostatic hypertrophy
TURP	-	Transuretral resection of prostate
TUNA	-	Trnsurethral needle ablation of prostate
TUMT	-	Transurethral microwave thermotherapy
TUVP	-	Transurethral vaporization of prostate
Bld. Loss	-	Blood loss
Tissue wt	-	Resected tissue weight
Calc. blood loss	-	Calculated blood loss
gms	-	Grams
malig.	-	Malignant
Hb	-	Haemoglobin
Pre.op	-	Pre operative
Infl.	-	Influencing
Gl.	-	Gland
Ac.	-	Acute
Pts	-	Patients
Scope	-	Cystoscope

INTRODUCTION

The increase in life expectancy of the population has led to an increase in the prevalence of geriatric problems like Benign prostatic hyperplasia. Benign Prostatic hyperplasia (BPH) has become a significant public health problem adding to the cost of health care in the society.

Transurethral resection of the prostate remains the gold standard treatment of BPH. Though the mortality of TURP has decreased to less than 1%, the significant morbidity of the bleeding complications still persist. An ideal complication free treatment of BPH still remains a mirage. From treatment by medicine using alpha blockers and 5 alpha reductase inhibitors to laser prostatectomies, all treatment modalities have their own side effects.

Also patients undergoing TURP mostly belong to high risk group owing to the age and related co-morbidities. Hence blood losses must be replaced promptly to ensure an optimal blood volume and oxygen transport.

Various studies have been done to determine the factors that influence bleeding during the procedure and estimation of blood loss during TURP will help to assess the need for replacement thus reducing morbidity and mortality.

The possible variables which can influence the blood loss are the size of prostate gland, type of presentation, operating time, weight of the resected prostatic tissue , histology and so on.

Assessing the relative importance of the influencing factors will be useful to implement any changes that could reduce blood loss and transfusion rate.

The present study is done to identify the factors which influence blood loss in one of the most common urological procedures and suggest possible remedies to decrease the bleeding morbidity.

AIM OF THE STUDY

To estimate blood loss during Transurethral Resection of Prostate and to study factors influencing blood loss in transurethral resection of prostate.

REVIEW OF LITERATURE

Anatomy of prostate

The adult prostate weighs around 20 gms[25] and is shaped like an inverted cone, with its base at the bladder neck and narrow apex caudally. Where it protrudes in to pelvis, the fibromuscular capsule is coated by the endopelvic fascia.

Approximately 30% weight of prostate is fibromuscular, with glandular epithelium accounting for the rest.

The prostate consists of 5 lobes according to Lowsley.

Anterior, Posterior, Median, Right lateral, Left lateral. The median lobe is Frequently reffered during transurethral resection of prostate, as it bulges from the floor of the urethra, often projecting intravesically,

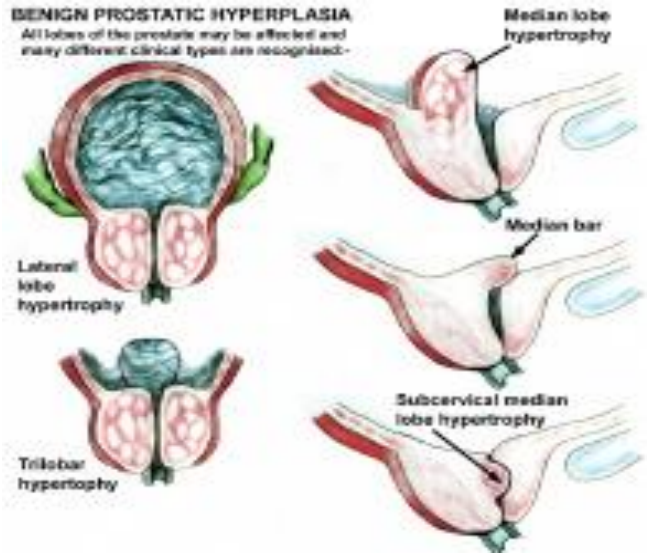
According to McNeal (1972) The prostate has 3 zones: peripheral, central, and transition[25].

The peripheral zone is the largest of the zones, constitutes 70% of the total prostate tissue in normal men . Prostate cancers mostly arises in the peripheral zone. On either side of the urethra peripheral zone lies posteriorly and extends laterally.

The central zone arises around the ejaculatory ducts to the base of the bladder. It Constitutes 25% of prostate tissue. The transition zone arise beneath the preprostatic sphincter to pass its lateral and posterior side. It constitute 5-10% of prostatic glandular tissue . BPH arises mostly from transition zone. 20% prostatic adenocarcinoma arises from this zone

The prostatic urethra can be seen obstructed intraoperatively , because of the enlargement of two lobes of transition zone on either side.

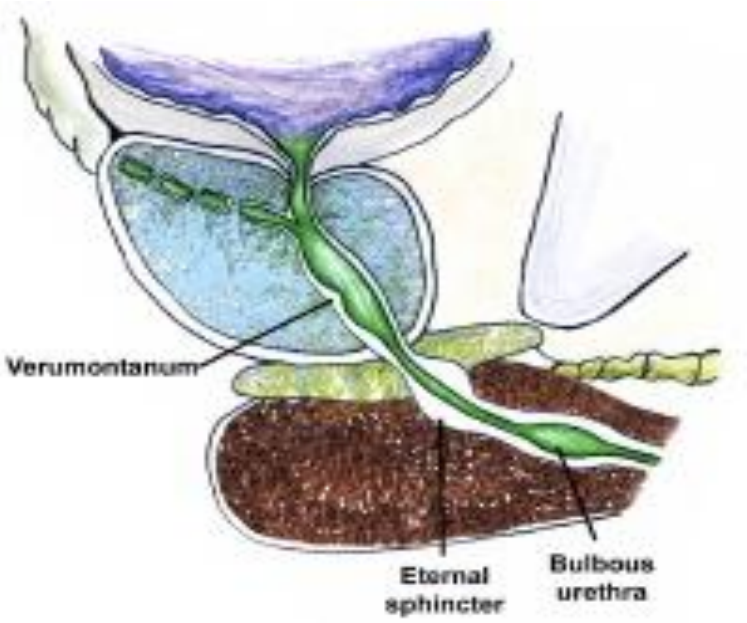
Median lobe is enlargement of the periurethral glands which is seen as teardrop-shaped midline structure at the posterior bladder neck



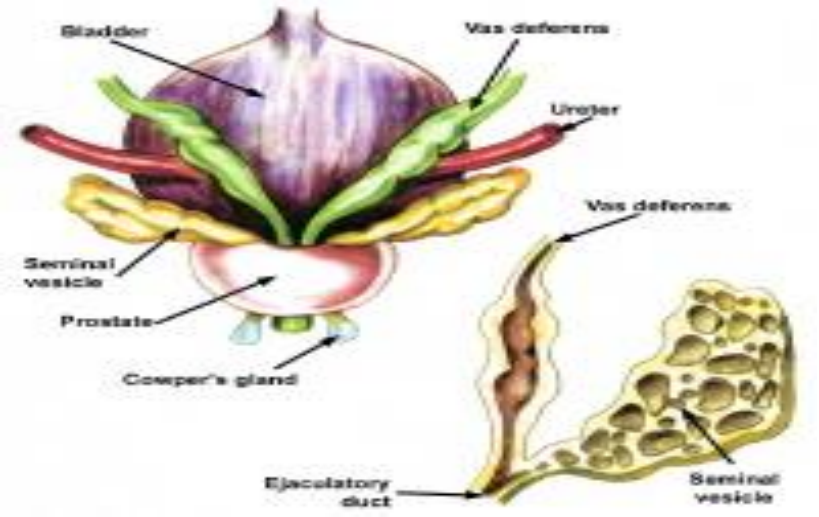
Median And Lateral Lobes Enlargement & Trilobar Enlargement Prostatic Urethra

The prostatic urethra measures about 3 cm long, commencing at the bladder neck and becoming the membranous urethra at the level of urogenital diaphragm.The posteror wall of prostatic urethra is intented longitudinally by the urethral crest, terminating distally at the Utericle (vestigial remnant of paramesonephric duct)The protatic ducts empty in to prostatic urethra on either side of urethral crest(prostatic sinuses).The ejaculatory ducts entering at the level of the Utericle.

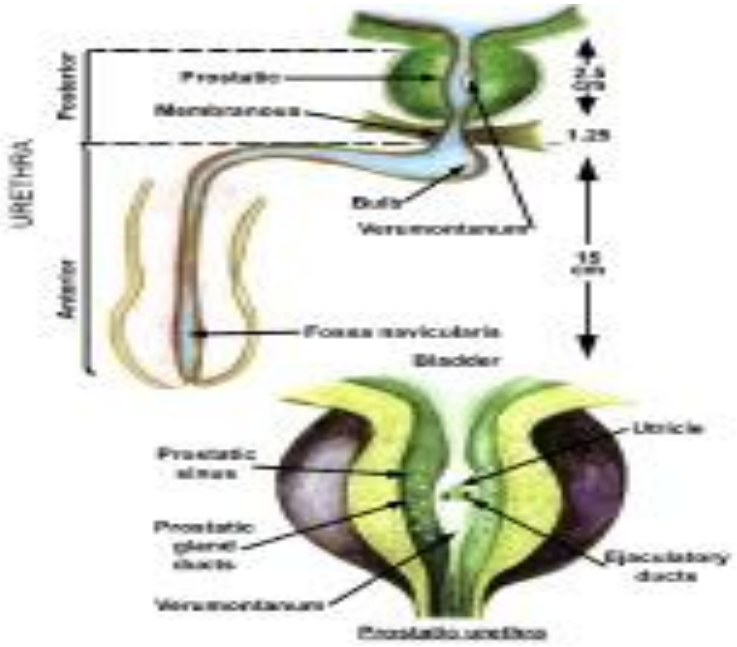
The prostatic urethra turns anteriorly through an ankle of approximately 35^0.This angulation divides the prostate into prostatic and preprostatic segments. Within the preprostatic urethra, the preprostatic sphincter is formed by a focal thickening of circular smooth muscle. Beneath the layer the Periurethral glands lies. Together with the glandular tissue of the transition zone, they become the site of origin of BPH. Most important anatomical landmark in TURP is the verumontanum . It is an elevation located on the floor of the distal prostatic urethra just proximal to the external sphincter muscle. When doing cystoscopy ,veru is seen as a rounded hump in the prostatic floor at the 6-o'clock position. Resection distal to veru causes external sphincter damage



Prostate Anatomy Sagittal View

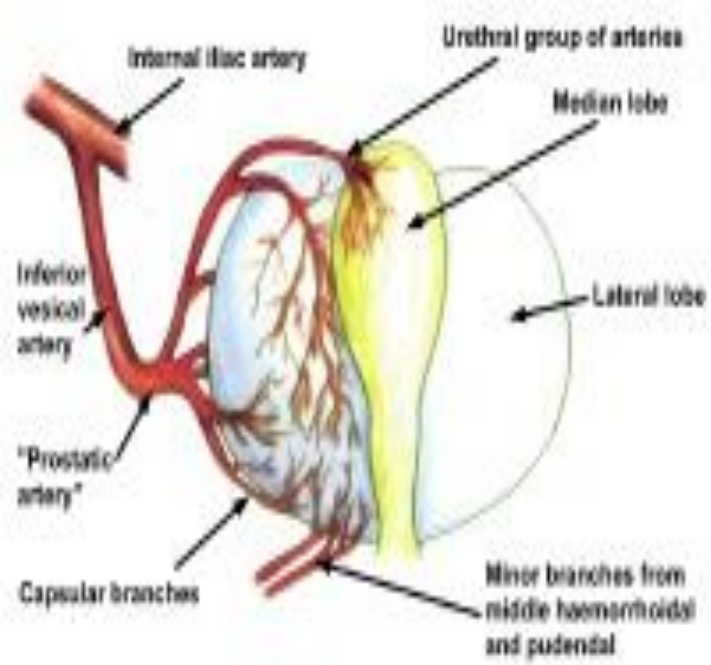


Prostate And Bladder Anatomy - Posterior Section



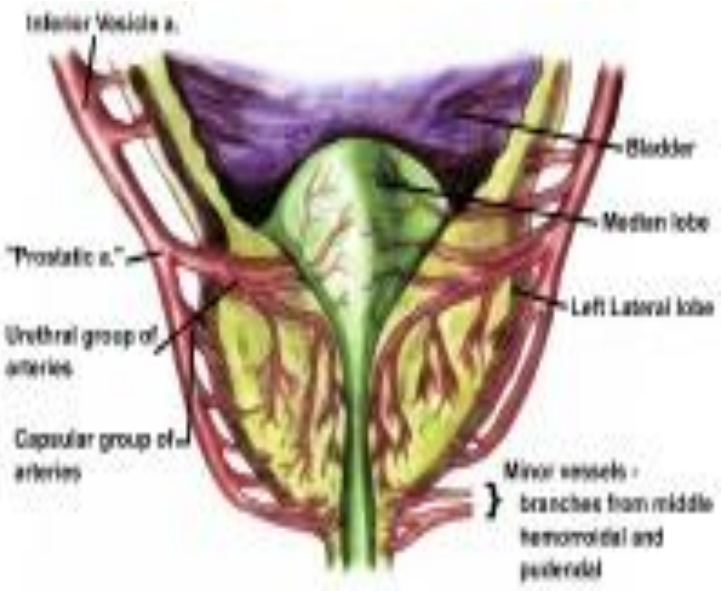
Prostate And Urethra Anatomy

In 1937 Rubin Flocks described the vascular anatomy of the prostate accurately. The prostate blood supply comes primarily from branches of the inferior vesical artery, which is a branch of the Internal iliac artery



Prostate Blood Supply

Inferior vesical artery reaches the prostate just at the vesicoprostatic border, there it branches into 2 groups of arteries. One group passes directly into the prostate toward the interior of the bladder neck. When reaching the prostatic interior near the urethra, most branches turn distally and parallel the prostatic urethra, while others supply the median lobe.



Prostate blood supply. Two main branches: capsular and urethral

Vessels that parallel the prostatic urethra supply most of the blood to the Hypertrophied lateral lobes. The arteries of second large group follows the exterior of the prostatic capsule posterolaterally, periodically gives rise to perforating vessels, and supplies the area around the verumontanum.

Transurethral resection of prostate is the gold standard treatment of bladder outlet obstruction due to benign prostatic hyperplasia. The technique has undergone various modifications due to better understanding of the natural history and evolution of the disease.

Chronological development of prostatectomy:[9]

Four generations of prostatectomy[30]

1. Open prostatectomy

2. Monopolar prostatectomy

3. Different minimally invasive techniques including TUNA, TUMT, TUVP, Laser therapy

4. Bipolar resection

Ramans celsus and Galen attempted the treatment for prostatic obstruction by introducing a catheter to empty the bladder in first century AD.

1726: LaFaye of Paris – introduced curved hollow sound with sharp pointed stylet.

1874: Enrico Bottini (First Electrical prostatic surgery) made several incisions in lateral and medial lobe.

1909: Hugh Hampton Young developed cold cut punch for Prostate resection which was used blindly.

1909: Edwin beer demonstrated Electrical cautery that worked under water .

Thomas J. Kervin designed a method which allowed placement of a needle for electrical coagulation prior to resection.

1932: Joseph F.McCarthy first introduced the modern Resectoscope with two handed rock and pinion style working element.

Jore Iglesius de la torre invented an external spring loaded model.

1968 Transurethral resection continous flow using suprapubic trocar was introduced first in Europe by HansJauchim Reuter .

1975: Iglesius introduced first successful continous flow resectoscope.

With improvements in technique the mortality of the procedure has become negligible. Bleeding during and after the procedure remains a cause of significant morbidity and need for transfusions in the post operative period with its resultant complications.

INDICATIONS FOR TURP:[25]

1. Refractory urinary retention – at least one failed trial Void.
2. Recurrent urinary tract infection due to BPH.
3. Recurrent gross hematuria from BPH.
4. Renal insufficiency secondary to BPH / chronic retention.
5. Bladder calculi secondary to BPH.
6. Large bladder diverticulum secondary to an Enlarged prostate.
7. Non compliance with medical management or
   Refractory to medical management.

CONTRAINDICATIONS:[25]

General:

1. Unstable cardio pulmonary status.
2. Recent myocardial infarction or arterial stent placement.
3. Uncorrectable bleeding disorder .
4. Myasthenia gravis patients , or multiple sclerosis patients.

Relative:

1. Parkinsons disease with impaired external sphincter function.

Urological:

1. Active urinary tract infection.
2. In major pelvic fracture with permanent damage to external urinary sphincter , Post TURP incontinence is a significant complication .

Overall success rate of TURP in terms of objective and subjective improvement is 85-95%.

Other minimally invasive options in BPH:

1**. TUMT** – transurethral microwave thermotherapy

2**. TUNA** – Transurethral needle ablation

3.**TUVP** – Transurethral vaporization of Prostate

4**. LASER** therapy for Prostate – HOLEP, PVP

TURP TECHNIQUE:[25]

Instruments required :

Telescope: 30^0 telescope is preferred for TURP

Sheath : 19,20,21 , fr Cystoscope sheath for initial cystoscopy

: 24 - 27fr sheath are commonly used resectoscope sheath

Schmidl's visual obturator

Iglesius continous flow resectoscope

working element –rack & pinion type

--active cutting type (Baumrucker)

--passive cutting type(Nesbit)

Loops : Tungsten loops , Platinum loops 24 – 27fr size

Toomey syringe / Ellicks evacuator

Otis urethrotome

Endocamera , Light source , light cables and monitors

Diathermy : 300w

Cutting 130w

Coagulation 80w

Irrigants :

sterile water

Glycine 5%

Mannitol 5%

Sorbitol 5%

PROCEDURE:[25]

Initial cystoscopy should be done .The Resectoscope is introduced into the bladder, under vision using the schmidts visual obturator

TECHNIQUE:

Nesbits technique:

If the median lobe is small, resection is started at the 11 0' clock position and continued till the capsule is seen. Resection of right lobe from lateral to medial aspect . Resection is continued towards 6 0' clock position.Stepwise resection helps in decreasing blood loss and in effective removal of the prostate. Same process is repeated on contralateral lobe .

In patients with large median lobe, median lobe should be resected first for better irrigation flow after completing the median lobe lateral lobes can be resected

Apical resection:

10 -15% of adenoma project distally beyond the veru such projections have to be resected with precision for flow outcome. At the same time a word of caution is to remember that too much coagulation and resection beyond the adenoma in the apex can damage the rhabdosphincter. It is preferable to leave a ribbon of mucosa at the 12'0 clock position to prevent bladder neck stenosis. All the arterial bleeder should be secured. Minimal venous ooze is acceptable. The out flow should be non pulsatile and light pink in colour.

RESECTION TIME

It is preferable to complete the resection within 60 minutes to avoid hyponatremia especially if water is used as irrigant . In case of larger glands (>100gms) restrict resection to 1 lateral lobe and median lobe. In patients with renal failure and cardiac failure resection time has to be restricted to avoid fluid overload. If resection is less than optimum in one hour , hemostasis can be secured and the second stage TURP is planned after 48 hours.

Complications:[25]

1. Hemorrhage.
2. TUR syndrome.
3. Hypothermia.
4. Transient bacteremia and septisemia.

5. Transient blindness.

6. Hyperammonemia.

7. Sphincter injury.

8. Bladder perforation.

9. Difficult insertion of catheter.

10. Blocked catheter.

Various studies have been done to asses the factors influencing the blood loss in TURP.

Kirollos M.M and Cambell N[2] published an audit of factors influencing bleeding in TURP. They reported that the perioperative blood loss was equivalent to a decrease in hemoglobin of 10-15 gm/l (8-11%) in TURP. The Resected tissue weight was the most important factor in determining blood loss.

Regional anaesthesia was also associated with decreased blood loss. The use of suprapubic catherisation for irrigation had a slight advantage in management of patients with large prostate. The type of presentation and histopathological report of the resected specimen did not influence blood loss. Patients with a normal preoperative Hemoglobin and resection less than 30 gms did not require perioperative blood transfusions.

Shrestha BM et al[10] published the influence of Anaesthesia, operating time, weight of resected tissue and histology of tissue

resected, on blood loss during and after TURP. They found that intraoperative and post operative blood losses were not influenced by the anaesthesia type, resection time, volume of resected tissue, and histology of resected tissue.

Ekengren Jan and Hahn Robert .G[8] Studied Blood loss measurement during TURP.

The blood loss measured from 10- 3825ml . Mean 300ml. The weight of resected tissue and the operating time was independent predictors of blood loss. Malignancy and general anaesthesia were associated with smaller blood loss.

Lars Sandfeldt [22]published blood loss in Transurethral resection of prostate. In this study the resected tissue weight (10-31gms) . Mean 17.5gms.

Resection time 29-70min (50min). Blood loss 71-777 ml (287ml). Blood Hemoglobin concentration 13.5-15.5 (14.5gm/dl).

Aiden M O ' Donnell et al[15] Anaesthesia for TURP analyzed various Factors associated with excessive bleeding include large gland, extensive resection (>40–60 g of prostate chippings), coexisting infection, prolonged surgery (>1 h), and the presence of a preoperative

urinary catheter. The histology of the gland is not associated with differences in bleeding.

Blood loss can be estimated by assaying the hemoglobin concentration of the discarded irrigation fluid, or by measuring the electrical conductivity of the discarded irrigation fluid, or in the laboratory by radioactive albumin or red-cell labeling techniques.

R.A.S Hemat, Urotext-LUTS[32] studied factors affecting blood loss in TURP.

Age of the patient – bleeding was more severe in old patients. Histology - Increased bleeding from Benign gland. Presence of UTI causes Increased blood loss in UTI due to secondary Hemorrage . Type of Anaesthesia had no conclusive difference. Drugs Aspirin, Heparin, causes increased blood loss . Weight of resected gland, Increased blood loss in large resected gland weights. Operative experience have differences in blood loss.

Martin maezalek et al[32] department of urology viena Austria – EAU[32] studied TURP published between 1986 and 1998, the mean transfusion rate was 8.6%,with a wide range of 0–35% . In Reich's series, bleeding requiring transfusion occurred in 2.9% of patients.

Risk of bleeding is increased with preoperative infection , urinary retention, (because of the congested gland) prostate volume, and resection time. In the case of significant peri- and postoperative bleeding, balloon compression (knotted gauze around the catheter/ tension of a 500-cm3 bottle) is the method of choice.

Rectodigital compression of the prostate may be useful. HF generators and instrumentation (continuous-flow instruments, video-TURP) the major Technical improvements, resulted in a significant decrease in the transfusion rate.

TECHNIQUES OF ESTIMATION OF BLOOD LOSS EVALUATION:

In 1930[s] **Pitcher**[30] worked out a method of determining blood loss following TURP by using a photometer with an accuracy within 3% - 5%.

In 1940[s] **Nesbit and Conger**[11] calculated the concentration of blood in irrigation fluids by comparing the color of tubes colored to correspond to known concentration of hemoglobin.

In 1950[s] **Leveen and Rubricius**[30] invented a blood loss monitoring device that records changes in conductivity associated with different concentrations of blood and electrolytes.

In 1960 s **Dismond and Gorden**[13] started routine measuring of blood loss with a photometer with which it was possible to measure within 2 minutes how much Haemoglobin had been lost.

In 1980 s **Ekengren and Hahn**[8] started to use the portable and battery run Hemocue TVR-Hemoglobin photometer with disposable vials already containing the reagent.

TA .Boliston[30] published blood loss estimation during TURP by cell counts on irrigation fluid. Cell counts on the fluid were performed using Neubauer hemocytometer and microscope. The volume of blood loss is calculated from the ratio of blood count in irrigation fluid to the patients red cell count was multiplied by the volume of fluid .

Wattanachai ungjaaroenwathana M.D et al [14] published blood loss determination in Transurethral resection of prostate by Urine strip using RBCs concentration. This method is useful and practical in immediate post operative blood loss evaluation and is reliable and accurate as spectrophotometric method.

Malde A anaesthesia for TURP[33] , anaesthesia review course Tata memorial hospital Mumbai, India uses a way to calculate blood loss using hematocrit of irrigant solution .

MATERIALS AND METHODS

Type of study : Prospective study

Patients with BPH treated with Transurethral resection of prostate at Kilpauk Medical college & Government Royapettah Hospital between January 2012 and February 2013 were included in the study.

Patient who require surgery because of severe symptoms or retention of urine secondary to BPH were included in this study.

Total number of patients included in the study is 40 .

Ethical committee approval was obtained .

Informed consent was obtained from all patients.

Inclusion criteria

1. All patients undergoing TURP.

Exclusion criteria:

1. Patients on Anticoagulants.

2. Patients with bleeding disorders.

3. patients treated early by 5alpha reductase inhibitor.

4. Patients with Renal failure.

Patients assessment began from outpatient department with detailed history including Type of presentation , Acute retention or not & Physical examination including digital rectal examination

Laboratory examination include

1. Complete blood picture , bleeding time , clotting time.

2. Preoperative Hemoglobin .

3. Blood sugar , urea , serum creatinine , electrolytes.

4. Urine analysis and culture & sensitivity were performed.

5. Chest x ray & ECG

6. Ultrasound of kidney , bladder, & prostate were done .

The prostate was imaged in the coronal and sagittal sections and the volume calculated using ellipsoid formula

(volume = height x width x length x0.52)

7. Uroflowmetry were carried out in selected patients.

All TURP in this study were conducted under spinal anasthesia given by experienced anesthetists.

The operation were carried out as patients in the lithotomy position with a Karl Storz 24fr resectoscope with sterile water as an irrigant .

Nesbits and Blandy's technique were used for performing TURP.

After proper positioning & draping,

Cystourethroscopy was done by 22fr sheath with 30^0 telescope to assess Urethra, Veru, Prostate, Ureteric orifice and bladder.

Urethral dilatations were done only in cases where passage of scope was not easy.

24fr continuous irrigation resectoscope with passive cutting working element were used for resection.

Monopolar Diathermy on pure mode was used.

Hemostasis was done by pin point coagulation & roller ball coagulation.

The resection time was measured from the insertion to the removal of resectoscope.

The volume of irrigation fluid was measured.

The sample were collected from the irrigation fluid bucket after continuous stirring for 5 minutes samples taken and sent for hemoglobin estimation. Hemoglobin measurement was done by a photometer SYSMEX KX 21.

All resected prostatic tissues were dried , weighed and dispatched for histological examination.

The blood loss was estimated using the formula:

Blood loss in ml =

$$\frac{\text{Hb content of the irrigant fluid (gm/L)X Volume (L) x 1000}}{\text{Pre operative Haemoglobin(gm/dl) x5.2}}$$

The result will be assessed using Student's T test, Pearson product Moment correlation coefficient and Chi-square test as appropriate.

Photometer Sysmex Kx 21

OBSERVATION AND RESULTS

DSA Descriptives

DESCRIPTIVE STATISTICS

	N	Mini.	Maxi	Mean	Std. Deviation
Age	40	56	85	68.93	7.467
Preop Hb	40	9.4	13.6	11.293	1.0131
Gland size	40	30	82	53.80	13.960
Operating Time	40	35	70	52.38	10.252
Resected Tissue Wt	40	16	39	26.30	6.696
Calc. bloodloss	40	84.6	240.5	129.790	37.1299
Valid N (listwise)	40				

CORRELATIONS

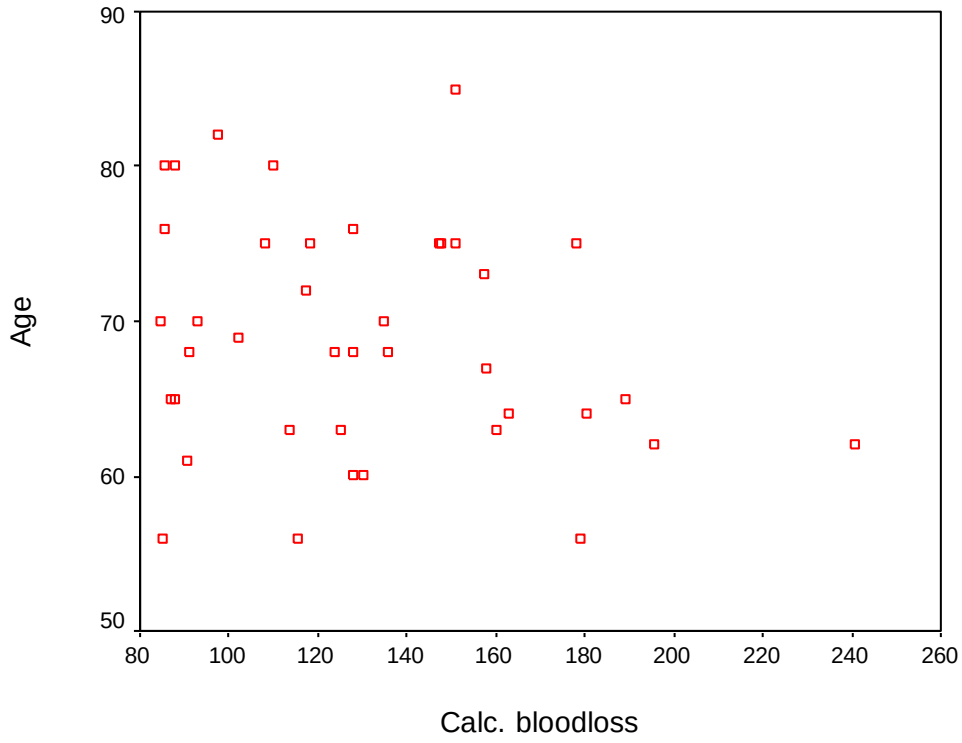
		Age	Preop Hb	Gland size	Operating Time	Resected Tissue Wt	Calc. bloodloss
Age	Pearson Correlation	1	-.269	-.184	.153	-.227	-.214
	Sig. (2-tailed)	.	.093	.255	.346	.159	.185
	N	40	40	40	40	40	40
Preop Hb	Pearson Correlation	-.269	1	-.025	-.248	.105	.015
	Sig. (2-tailed)	.093	.	.877	.124	.520	.925
	N	40	40	40	40	40	40
Gland size	Pearson Correlation	-.184	-.025	1	.621(**)	.753(**)	.674(**)
	Sig. (2-tailed)	.255	.877	.	.000	.000	.000
	N	40	40	40	40	40	40
Operating Time	Pearson Correlation	.153	-.248	.621(**)	1	.486(**)	.419(**)
	Sig. (2-tailed)	.346	.124	.000	.	.001	.007
	N	40	40	40	40	40	40
Resected Tissue Wt	Pearson Correlation	-.227	.105	.753(**)	.486(**)	1	.936(**)
	Sig. (2-tailed)	.159	.520	.000	.001	.	.000
	N	40	40	40	40	40	40
Calc. bloodloss	Pearson Correlation	-.214	.015	.674(**)	.419(**)	.936(**)	1
	Sig. (2-tailed)	.185	.925	.000	.007	.000	.
	N	40	40	40	40	40	40

** Correlation is significant at the 0.01 level (2-tailed).

CORRELATIONS BETWEEN AGE AND CALCULATED BLOOD LOSS

		Age	**Calc. Bloodloss**
Age	Pearson Correlation	1	-.214
	Sig. (2-tailed)	.	.185
	N	40	40
Calc. bloodloss	Pearson Correlation	-.214	1
	Sig. (2-tailed)	.185	.
	N	40	40

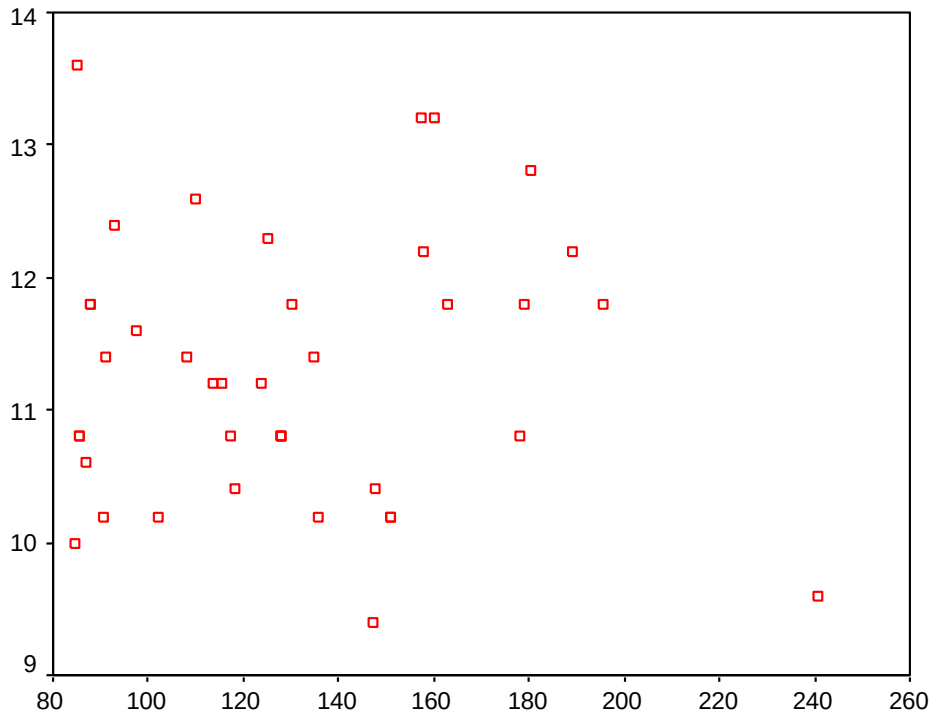
GRAPH


90
80
70
60
50
Age
80
100
120
140
160
180
200
220
240
260
Calc. bloodloss

CORRELATIONS BETWEEN PREOPERATIVE HEMOGLOBIN AND CALCULATED BLOOD LOSS

		Preop Hb	**Calc. bloodloss**
Preop Hb	Pearson Correlation	1	.015
	Sig. (2-tailed)	.	.925
	N	40	40
Calc. bloodloss	Pearson Correlation	.015	1
	Sig. (2-tailed)	.925	.
	N	40	40

GRAPH

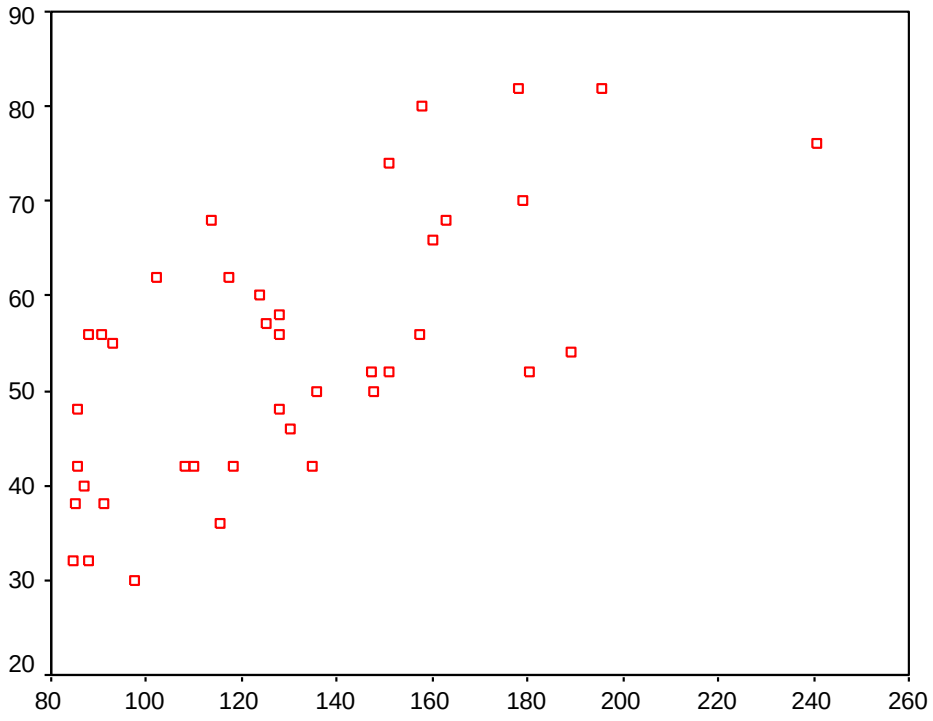

14
13
12
11
10
9
80
100
120
140
160
180
200
220
240
260
Calc. bloodloss

CORRELATIONS BETWEEN GLAND SIZE AND CALCULATED BLOOD LOSS

		Gland size	**Calc. bloodloss**
Gland size	Pearson Correlation	1	.674(**)
	Sig. (2-tailed)	.	.000
	N	40	40
Calc. bloodloss	Pearson Correlation	.674(**)	1
	Sig. (2-tailed)	.000	.
	N	40	40

** Correlation is significant at the 0.01 level (2-tailed).

GRAPH

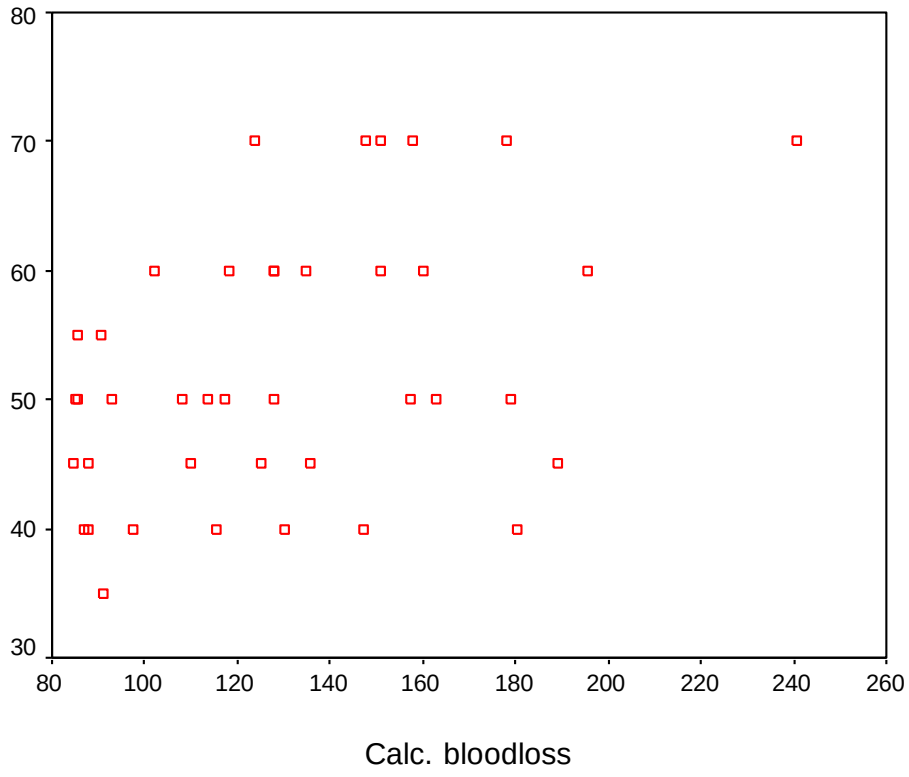

90
80
70
60
50
40
30
20
80
100
120
140
160
180
200
220
240
260
Calc. bloodloss

CORRELATIONS BETWEEN OPERATING TIME AND BLOOD LOSS

		Operating Time	**Calc. bloodloss**
Operating Time	Pearson Correlation	1	.419(**)
	Sig. (2-tailed)	.	.007
	N	40	40
Calc. bloodloss	Pearson Correlation	.419(**)	1
	Sig. (2-tailed)	.007	.
	N	40	40

** Correlation is significant at the 0.01 level (2-tailed).

GRAPH

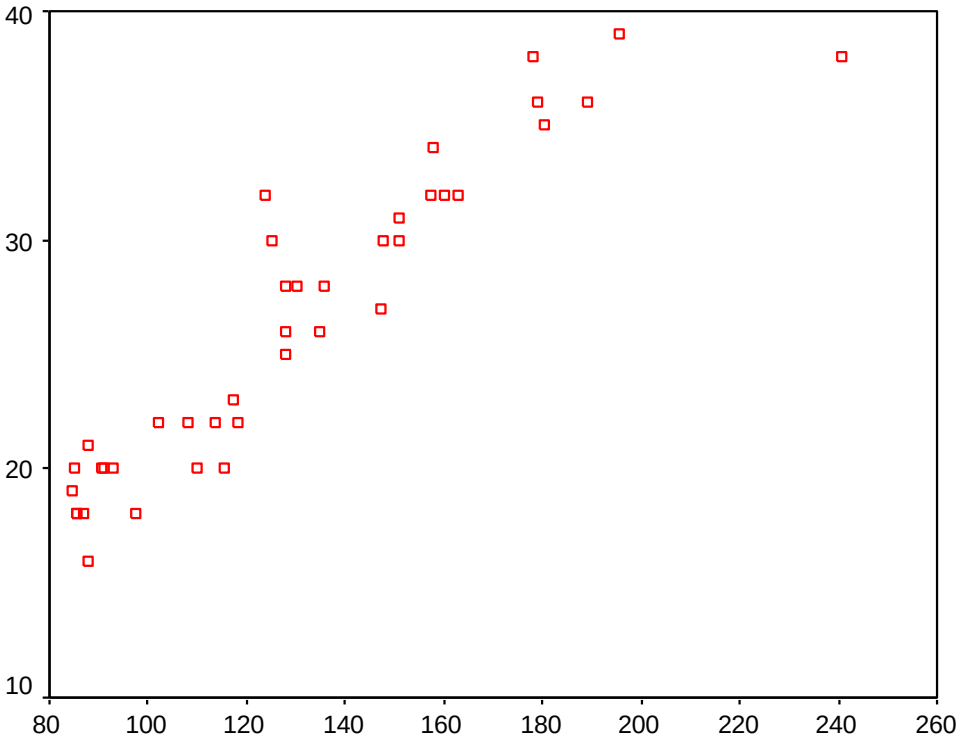

80
70
60
50
40
30
80
100
120
140
160
180
200
220
240
260
Calc. bloodloss

CORRELATIONS BETWEEN RESECTED TISSUE WEIGHT AND CALCULATED BLOOD LOSS

		Calc. bloodloss
Resected Tissue Wt	Pearson Correlation	.936(**)
	Sig. (2-tailed)	.000
	N	40

** Correlation is significant at the 0.01 level (2-tailed).

GRAPH


40
30
20
10
80
100
120
140
160
180
200
220
240
260
Calc. bloodloss

CORRELATION BETWEEN URINARY RETENTION AND BLOOD LOSS

T-Test

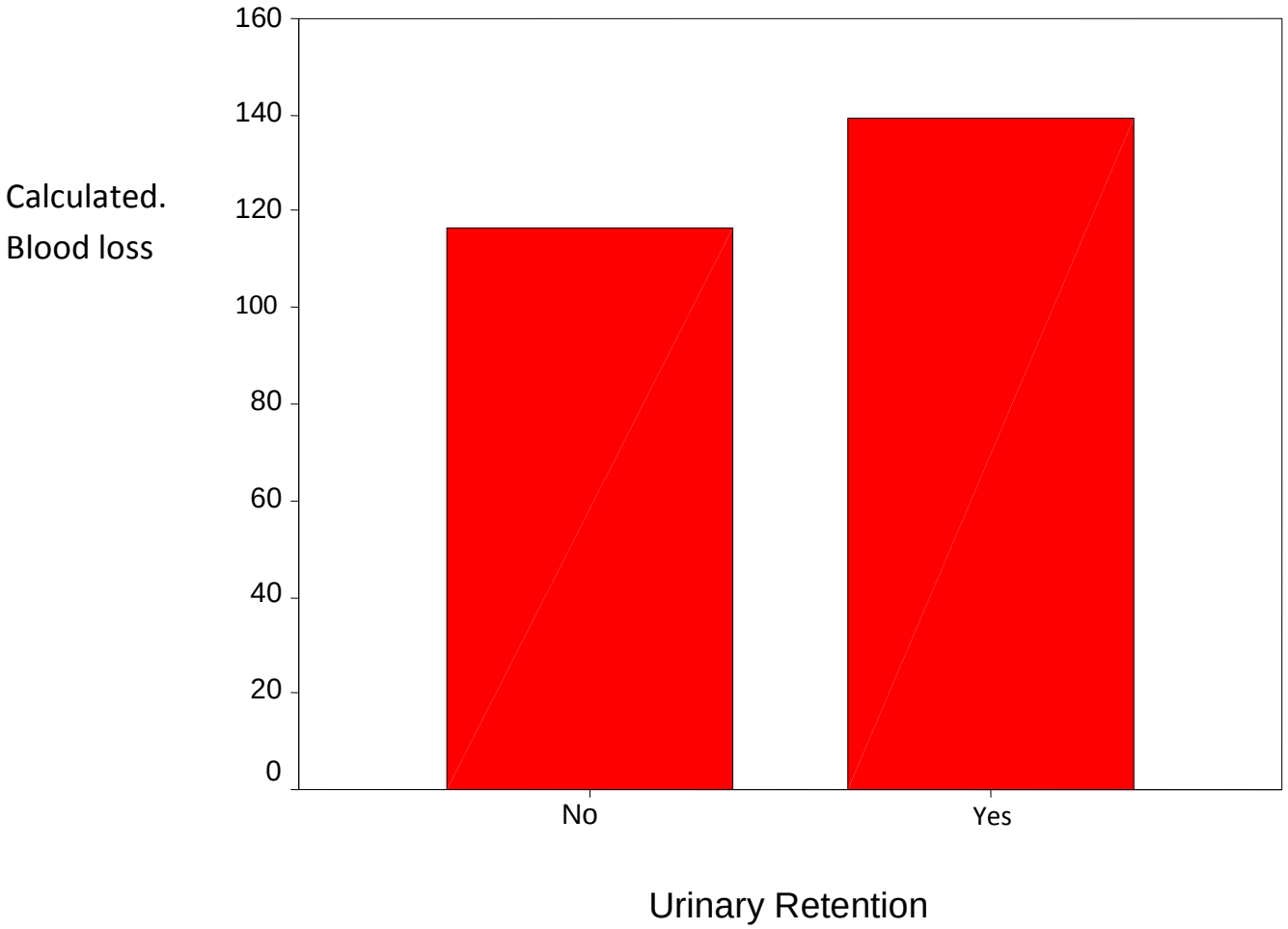
Group Statistics

	Urinary Retention	N	Mean	Std. Deviation	Std. Error Mean
Calc. bloodloss	NO	17	116.759	29.5810	7.1744
	YES	23	139.422	39.7409	8.2866

Independent Samples Test

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff	95% Confidence Interval of the Difference	
						Lower	Upper
Calc. bloodloss	-1.978	38	.055	-22.663	11.4556	-45.8536	.5278
	-2.068	37.991	.046	-22.663	10.9608	-44.8521	-.4737

GRAPH


Calculated.
Blood loss
160
140
120
100
80
60
40
20
0
No
Yes
Urinary Retention

CORRELATIONS BETWEEN HISTOLOGY AND CALCULATED BLOOD LOSS

T-Test

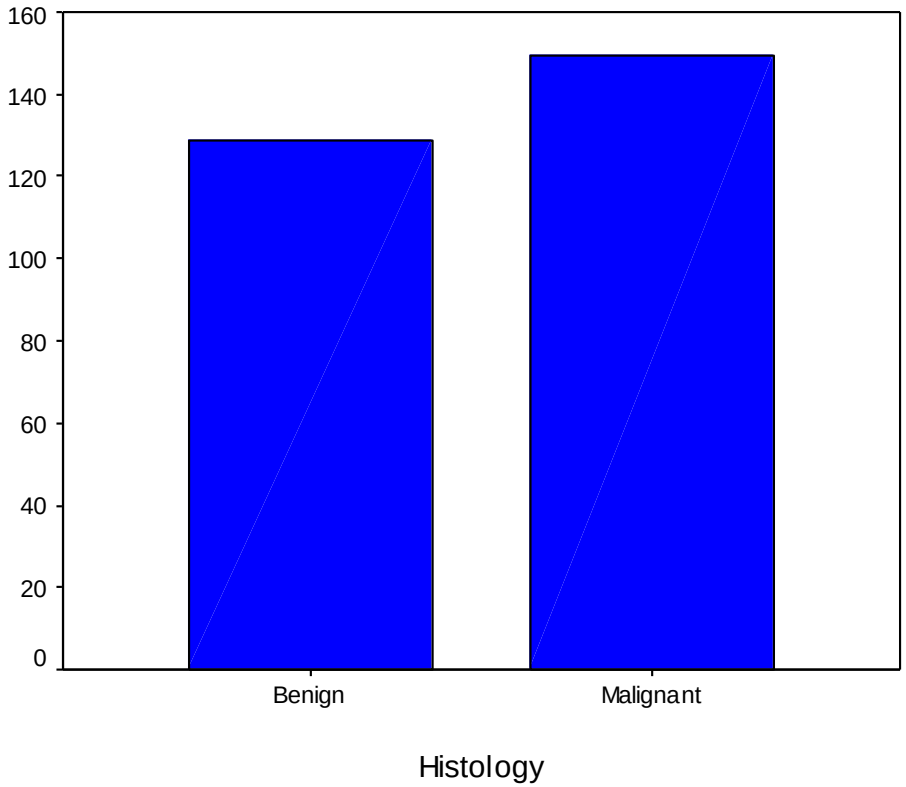
Group Statistics

	Histology	N	Mean	Std. Deviation	Std. Error Mean
Calc. bloodloss	Benign	38	128.758	37.8305	6.1369
	Malignant	2	149.400	2.1213	1.5000

Independent Samples Test

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Dif	Std. Error Diff	95% Confidence Interval of the Difference	
						Lower	Upper
Calc. bloodloss	-.762	38	.451	-20.642	27.0828	-75.4683	34.1841
	-3.267	36.706	.002	-20.642	6.3176	-33.4462	-7.8380

GRAPH



ANALYSIS

1.Correlation between Age and calculated blood loss

Calculated blood loss:

Minimum blood loss: 84.6ml.

Maximum blood loss: 240.5ml.

Average blood loss: 129.8 ml.

Age of the patients:

In our study

Minimum age : 56 yrs.

Maximum age : 85 yrs.

Average : 68.93 yrs.

Correlation between Age and calculated blood loss

P value is 0.185.

No signifigance is defined.

Correlations between Preoperative Hemoglobin and calculated blood loss:

Preoperative Hemoglobin

Preoperative Hb gm%:

Minimum : 9.4 gm%.

Maximum : 13.6 gm%.

Average : 11.29 gm%.

P value is 0.925.

Preoperative Hb level is not significant.

Correlation between Gland size and calculated blood loss:

Minimum : 30 gms.

Maximum : 82 gms.

Average : 53.80gms.

P value is 0.000 .

Correlation between gland size and calculated blood loss was significant

If the gland size is bigger the blood loss will be more.

Correlation between Operating time and calculated blood loss:

Minimum : 35 min.

Maximum : 70 min.

Average : 52.38.

P value is 0.007.

Operating time correlation with blood loss will be significant

If resection time is longer , blood loss will be more.

Correlation between Resected tissue weight and calculated blood loss

Minimum : 16gm.

Maximum : 39gm.

Average : 26.30.

P value is 0.000.

Correlation between Resected tissue weight and blood loss is significant

If there is large resected tissue the blood loss will be more.

HISTOLOGY

Malignant no. of patients: only 2 cases .

Mean blood loss 149.4ml.

Benign no. of patients: 38 cases.

Mean blood loss 128.752ml.

Pvalue is 0.451 Not statistically significant.

TYPE OF PRESENTATION:

Acute retention no. of patients: 23 . Mean blood loss 139.422ml.

No retention no. of patients: 17 .Mean blood loss 116.750ml.

P value is 0.055 Not statistically significant correlation.

DISCUSSION

Estimation of blood loss

It is very difficult to estimate blood loss during TURP because of mixing of Irrigant fluid with shed blood and the manner which irrigant-blood mixture is discarded.various studies had been conducted in the past to estimate blood loss during TURP.

In 1930[s] **Pitcher**[30] worked out a method of determining blood loss following TURP by using a photometer with an accuracy within 3% - 5%.

In1940[s] **Nesbit**[11] and Conger calculated the concentration of blood in irrigation fluids by comparing the color of tubes colored to correspond to known concentration of hemoglobin.

In 1950 **Leveen and Rubricius**[30] introduced a blood loss monitoring device which registered changes in conductivity associated with different concentrations of blood and electrolytes.

In 1960 s **Dismond and Gorden**[13] started routine measuring of blood loss with a photometer with which it was possible to measure within 2 minutes how much Haemoglobin had been lost,

In 1980 s **Ekengren and Hahn**[8] started to use the portable and battery run Hemocue TVR-Hemoglobin photometer with disposable vials already containing the reagent

TA .Boliston[30] published determination of blood loss during TURP by cell counts on irrigation fluid. Cell counts on the fluid were performed using Neubauer hemocytometer and microscope. The volume

of blood loss is calculated from the ratio of blood count in irrigation fluid to the patients red cell count was multiplied by the volume of fluid

Wattanachai ungjaaroenwathana M.D et al[14] published Estimation of blood loss in Transurethral resection of prostate by Urine strip using RBCs concentration. This method is practical and useful in immediate post operative evaluation of blood loss and is reliable and accurate as spectrophotometric method.

Malde A anaesthesia for TURP ,[33] anaesthesia review course Tata memorial hospital Mumbai, India uses a way to calculate blood loss using hematocrit of irrigant solution .

Our study of calculating blood loss is based on the calculation

Blood loss in ml =

$$\frac{\text{Hb content of the irrigant fluid (gm/L)X Volume (L)x1000}}{\text{Pre operative Haemoglobin(gm/dl) x5.2}}$$

Shrestha BM etal [10] studies showed mean blood loss was 95ml (5-936). In our study the mean blood loss is 129.8ml (84.6-240.8)

This value is about 34.8 ml more.

Jan Eken gren and Robert. G .Hahn[8] mean blood loss is 300 ml (10-3825) In our study mean blood loss is 129.8ml (84.6-240.8) The blood loss is 270.2 ml less than the study

Aiden M O Donnell et al[15] Anaesthesia for TURP study mean blood loss is 500ml. In our study mean blood loss is 129.8 ml The blood loss is 370 ml less than the above study

Tim Fagerstrom Stockholm Sweden[30] study mean blood loss is 855 ml

In our study mean blood loss is 129.8 ml The blood loss is 725.2 ml less.

In our study only one patient was transfused a single unit of blood post operatively.

In our study the mean blood loss is lesser when compared to other 3 studies and it is more when compared with one study.

AGE OF THE PATIENTS

Age was not significant influencing factor in almost all studies.

In our study mean age of the patient is 68.93 (56-85).

P value is 0.185 statistically not significant which correlates well with other studies.

PRE-OPERATIVE HEMOGLOBIN AND CALCULATED BLOOD LOSS:

Tim Fagerstrom Stockholm Sweden[30] study mean preoperative Hb was 14.18gms% no statstically significant correlation.

No significant influence was noted in other studies.

In our study the mean preoperative haemoglobin is 11.29 gms% (9.4-13.6gms%).

P value is 0.015 statistically not significant which correlates well with other studies

GLAND SIZE AND CALCULATED BLOOD LOSS:

Shrestha B.M Etal[10] study the gland size had no significant influence on blood loss.

M.M.Kirollos and N.Campbell[2] and Jan Eken gren and Robert G. Hahn[8] had not taken the factor for the study.

Tim Fagerstrom Stockholm Sweden[30] study mean prostate volume was 58.2gms no significant correlations.

In our study the mean gland size is 53.8 gms (30-82).

P value is 0.000 which is statistically significant.

In one study the gland size had no influence on blood loss , In our study the gland size has significant influence on blood loss

RESECTION TIME

Shrestha B.M. study [10] -There was no statistically significant correlation between Resection time and calculated blood loss.

Jan Eken gren and Robert. G .Hahn[8] there was a strong correlation between operating time and blood loss($r= 0.72$; $P< 0.0001$).

Martin marszalek et al[32] viena, Austria study resection time has significant correlation with blood loss.

Aiden O' Donnell et al[15] study Resection time > 1 hr had significant correlation with blood loss.

Tim Fagerstrom Stockholm Sweden[30] study mean resection time was 60 min had significant correlation.

In our study the mean resection time is 52.38 (35-70).

P value is 0.007 which has statistically significant correlation with blood loss.

Four studies had statistically significant correlation with blood loss and one study had no significant correlation. Similar to other studies our study has significant correlation between blood loss and resection time.

RESECTED TISSUE WEIGHT AND BLOOD LOSS

M.M.Kirollos and N.Campbell [2] study mean resected wt was 34.2gms

P value was <0.001 ,most important factor influencing bloos loss.

Jan Eken gren and Robert G. Hahn[8] study mean weight of resected tissue was 16.7(2-171) p<0.0001 strong linear correlation between blood loss and resected tissue weight

Shrestha B.M. study [10]–Mean resected tissue weight was 20.6 (3-60) There was no statistically significant correlation between Resected tissue weight and calculated blood loss.

Tim Fagerstrom Stom Sweden[30] study mean resected tissue wt was 26 gms.

P value was <0.001statistically significant correlation exists.

Aiden O' Donnell et al[15] study resected tissue weight had statistically significant correlation between Resected tissue weight and calculated blood loss.

In our study mean resected tissue wt is 26.30gms. P value is 0.000 which is statistically significant influential factor with blood loss.

In four studies significant correlation was present and in one study no correlation was seen. Our study is comparable with other studies has statistically significant linear correlation between the resected tissue weight with blood loss. The blood loss increases as the resected tissue weight increases.

HISTOLOGY OF RESECTED TISSUE

M.M.Kirollos and N.Campbell [2] study No difference in blood loss between patients with benign and malignant prostates.

Abram et al [3] greater blood loss and longer resection time in benign prostatic tissue.

Jan Eken gren and Robert G. Hahn[8] study blood loss was lesser in malignant tissue (215ml) than benign (350ml) P value was <0.007.

The degree of differentiation of carcinoma (high, moderate, or low) had no bearing on the blood loss.

Shrestha B.M. study[10] The blood loss did not show any correlation with histology.

Aiden O' Donnell et al [15] study show no relationship of Histology with blood loss.

In our study Benign tissue no. of patients 38. mean blood loss 128.75ml.

Malignant tissue no. of patients 2. Mean blood loss 149.4ml.

P value 0.002 which is not statistically significant.

In 3 studies no significant influence in blood loss between benign and malignant histology. In one study more blood loss in malignant. In one study less blood loss in malignant tissue. In our study the no. of patients with malignancy is only two,so comparison with other studies is not valuble

TYPE OF PRESENTATION (Acute urinary retention or not)

M.M.Kirollos and N.Campbell [2] study there was no difference in blood loss between acute retention patients and no retention patients, possibly because of antibiotics used in catheterized patients.

Shrestha B.M. [10] study No correlation between blood loss and patients presented with acute urinary retention **.**

Tim Fagerstrom Stockholm Sweden[30] study no correlations between blood loss and acute retention patients

Aiden O' Donnell et al study[15] Increased blood loss in patients with catheters for acute retention.

In our study the patients with acute retention no. of patients 23 .

Mean blood loss 139.422ml. P value 0.046.

Without acute retention no. of patients 17. Mean blood loss 116.759ml .

P value 0.005 . Both are statistically not significant.

In Three studies no correlation between blood loss and type of presentation. In one study blood loss increases with patients on catheter for acute retention .Explanation for this increase is infection in most catheterized patients causes more bleeding during prostatic resection.

Our study although slight increase in blood loss in acute retention patients, no statistically significant increased blood loss in acute retention patients, possibly because antibiotic prophylaxis was used routinely for all catheterized patients.

CONCLUSION

1. The concept of measuring the blood loss with the Low Hemoglobin Photometer has been proven to be an objective, reliable and easy method.

2. The extent of blood loss associated with TURP is multifactorial and it is impossible to measure the effects of single factor while controlling all others.

3. Some of the factors such as local vascularity are impossible to measure.

4. Of the measured factors, the weight of resected tissue is clearly the most important factor significantly increases the blood loss .

5. Other factors like larger gland size and the longer resection time significantly increase blood loss.

6. A meticulously performed TURP with reasonable speed and attention to details is the way forward in reducing perioperative blood loss.

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PROFORMA

Name: **KMC/GRH**

Date

Age: **Sex:** **IP No:**

Complaints

Strain to void **Duration-**

Fever - Present / Absent

Hematuria

Calcaluria

Dysuria

LUTS – Obstructive/Irritative

Treatment H/O:

Drug intake

catheterisation

Past H/O **DM** **HT**

TB **COPD**

Examination **fever** **Pallor** **obesity** **HT** **WT**

P/A:

Genitalia-

Per Rectum – Prostate size

INVESTIGATIONS

Preoperative Hb%

Irrigation fluid Hb%

Immediate postoperative Hb%

24 hours postoperative Hb%

Total count and differential count

Bleeding time/clotting time

Renal function tests

Urine albumin/sugar/deposits

Urine culture and sensitivity

Ultrasound KUB (prostatic size and post void residual urine)

X-ray KUB

Uroflow

Treatment:

Date of surgery:

Type of anaesthesia:

Starting time:

Completing time:

Weight of resected tissue:

Histopathological report:

Perioperative blood transfusion:

MASTER CHART

Sl. No	Name	Age	IPNo.	Urinary Retention	Preop Hb	Gland size	Operating Time	Resected Tissue Wt	Histology	Calc. bloodloss
1	Vellappan	75	997125	NO	9.4	52	40	27	Benign	147.2
2	Rajendran	62	997995	YES	9.6	76	70	38	Benign	240.5
3	Arumugam	76	998456	YES	10.8	48	60	25	Benign	128.1
4	Navaneethan	56	8020	NO	11.2	36	40	20	Benign	115.4
5	Ellappan	75	997125	NO	10.4	42	60	22	Benign	118.3
6	Kondiah	80	11025	NO	12.6	42	45	20	Benign	109.9
7	Nair	75	999698	NO	10.8	82	70	38	Benign	177.9
8	Dhanapal	68	100699	YES	11.2	60	70	32	Benign	123.7
9	Kuppusamy	80	100686	NO	10.8	48	55	18	Benign	85.4
10	Subramani	69	100928	YES	10.2	62	60	22	Benign	101.9
11	Narayanasamy	70	6282	YES	10	32	45	19	Benign	84.6
12	Kamalakannan	62	101603	YES	11.8	82	60	39	Benign	195.4
13	Arjunan	60	102166	YES	10.8	56	50	26	Benign	128.1
14	Devaraj	61	102395	NO	10.2	56	55	20	Benign	90.6
15	Mani	67	102411	YES	12.2	80	70	34	Benign	157.7
16	Kuppusamy	80	103547	NO	11.8	56	45	21	Benign	87.9
17	Appavu	63	21202	YES	12.3	57	45	30	Benign	125.1
18	Palani	60	19611	YES	11.8	46	40	28	Benign	130.3

19	Mani	72	21939	NO	10.8	62	50	23	Benign	117.5
20	Shanmugam	65	22955	YES	12.2	54	45	36	Benign	189.2
21	Srinivasan	82	25122	NO	11.6	30	40	18	Benign	97.7
22	Murugan	73	25750	YES	13.2	56	50	32	Benign	157.4
23	Kannan	56	25534	YES	11.8	70	50	36	Benign	179.2
24	Munusamy	56	25537	NO	13.6	38	50	20	Benign	84.9
25	Govindasamy	64	25519	YES	12.8	52	40	35	Benign	180.2
26	Abdul Rehman	65	25379	NO	10.6	40	40	18	Benign	87.1
27	Balakrishnan	70	27086	YES	12.4	55	50	20	Benign	93
28	Balu	63	29779	YES	13.2	66	60	32	Benign	160.3
29	Clive	75	31588	NO	11.4	42	50	22	Benign	107.9
30	Kasinathan	68	3381	NO	10.2	50	45	28	Benign	135.8
31	Ramachandran	64	33872	NO	11.8	68	50	32	Benign	162.9
32	Rajamanickam	85	35468	YES	10.2	52	60	30	Benign	150.9
33	Natchiappan	68	34104	NO	11.4	38	35	20	Benign	91.1
34	Ramiah	76	112934	YES	10.8	42	50	18	Benign	85.4
35	Karupiah	63	112586	YES	11.2	68	50	22	Benign	113.4
36	Kaliaperumal	75	112592	YES	10.2	74	70	31	Malignant	150.9
37	Murugapillai	70	114063	NO	11.4	42	60	26	Benign	134.9
38	Ramasamy	68	114528	YES	10.8	58	60	28	Benign	128.1
39	Kannaian	75	130216	YES	10.4	50	70	30	Malignant	147.9
40	Ramu	65	130245	YES	11.8	32	40	16	Benign	87.9

PLAGIARISM REPORT